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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,614	05/14/2001	Shuichi Furuoya	APM-01102	4827

26339 7590 12/30/2002

PATENT GROUP
CHOATE, HALL & STEWART
EXCHANGE PLACE, 53 STATE STREET
BOSTON, MA 02109

EXAMINER

JOLLEY, KIRSTEN

ART UNIT	PAPER NUMBER
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1762

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DATE MAILED: 12/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/854,614

Applicant(s)

FURUOYA, SHUICHI

Examiner

Kirsten Crockford Jolley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 22-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) 22-28 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/453,428.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 6) ☐ Other: ____

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claims 22 and 26-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Naka et al. (US 5,935,331).

With respect to claim 22, Naka et al. discloses a process of spin coating material onto a substrate comprising dropping coating material onto the substrate via nozzles 172 while rotating the substrate about its center, and while applying high-voltage pulses between the liquid chamber 175 and the substrate fixing base 173 (Figure 19 and col. 22, lines 10-45). Naka et al. teaches that the voltage pulses cause the liquid formed at the meniscuses of the discharge nozzles are attracted toward the substrate fixing base and the liquid is discharged onto the substrate; this is evidence that the electric field has an electric polarity opposite to an electric polarity of the coating material. See also col. 12-

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14 of Naka et al. Naka et al. teaches at col. 1 the use of its process on semiconductor substrates.

As to claim 26, the pulses applied in the process of Naka et al. meet Applicant's limitation of varying the intensity of the electric field periodically with lapse of time. The voltage applied to the substrate fixing base 173 meets Applicant's limitation of claim 27 of generating a second electric field below the substrate having an electric polarity opposite to an electric polarity of the coating material. As to claim 28, it is the Examiner's position that the force applied to the coating material by the electric field in the process of Naka et al. is inherently almost equal to a gravitational force on the coating material. See also col. 12, lines 25-52 which discusses the electrical charges on the particles causing them to spread on the substrate.

3. Claims 22 and 27-28 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 5-259053 A.

With respect to claim 22, JP '053 discloses a process of spin coating material onto a semiconductor substrate comprising dropping coating material onto the substrate via nozzle 4, and thereafter rotating the substrate about its center while applying voltages to lower annular electrodes 7 and upper annular electrodes 10. The application of voltages uniformly spreads the coating material over the semiconductor wafer. The electric field generated by JP '053 inherently has an electric polarity opposite to the electric polarity of the coating material, thus causing the coating material to deposit and spread on the substrate.

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The voltage applied to the lower electrodes 7 meets Applicant's limitation of claim 27 of generating a second electric field below the substrate having an electric polarity opposite to an electric polarity of the coating material. As to claim 28, it is known that the force applied to the coating material by the electrical field is almost equal to the gravitational force exerted on the coating material because the coating material is caused to spread on the substrate due to the electric field.

4. Claim 22 and 27-28 are rejected under 35 U.S.C. 102(b) as being anticipated by McMillan et al. (US 5,456,945).

With respect to claim 22, McMillan et al. discloses a process of coating material onto a semiconductor substrate comprising dropping coating material mist onto the substrate via input nozzle 8, while rotating the substrate about its center, and while creating DC bias between the substrate holder 4 and barrier plate 6 to deposit coating material onto the substrate 5 (see Figure 1 and col. 9, lines 1-18 and col. 17, lines 25-61). The electric field generated by McMillan et al.'s process inherently has an electric polarity opposite to the electric polarity of the coating material, thus causing the coating material to deposit and on the substrate.

The voltage applied to the substrate holder 4 meets Applicant's limitation of claim 27 of generating a second electric field below the substrate having an electric polarity opposite to an electric polarity of the coating material. As to claim 28, it is known that the force applied to the coating material by the electrical field is almost equal to the gravitational force exerted on the coating material because the coating material is caused to spread on the substrate due to the electric field.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 22-25 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-153669 A in view of JP 4-135667 A.

JP '669 discloses a method of applying coating material onto a semiconductor wafer by applying coating material from nozzle 15 and applying a high voltage between nozzle 15 and an electrode on the spin chuck 17 to electrically charge the photoresist coating material. It is known that the electric field around the semiconductor wafer (on the chuck) has an electric polarity opposite to an electric polarity of the coating material since the coating material is drawn to and deposited on the substrate.

JP '669 (Abstracts) lacks a teaching of rotating the semiconductor wafer. JP '667 is cited to illustrate a similar process whereby an electric field is formed between the nozzle 4 and an electrode in the spin chuck, whereby the spin chuck and wafer are rotated to uniformly distribute the coating material on the top of the wafer. It would have been obvious for one having ordinary skill in the art to have rotated the semiconductor wafer and spin chuck in the process of JP '669 upon seeing the prior art of JP '667 in order to obtain an even more uniform coating on the wafer.

With respect to claim 25, it is noted that JP '669 illustrates in Figures 1, 3, and 5 elements (reference numbers 19, 22, and 24, respectively) which also are electrically

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supplied with voltage. These elements represent an electrical field produced in a vertical direction. It would have been obvious for one having ordinary skill in the art to have varied the intensity of the electrical field in these vertical elements with respect to the electrode in the spin chuck through routine experimentation dependent upon the degree of attraction needed to contain the coating material or the coating pattern desired, as shown in the Figures. Similarly, with respect to claims 23 and 24, Figure 5 illustrates elements 24 arranged circumferentially around the semiconductor wafer, each individually supplied with voltage. It would have been obvious for one having ordinary skill in the art to have varied the intensity of the electric field circumferentially around the wafer via elements 24, depending upon the coating material pattern desired, through routine experimentation in the absence of a showing of criticality.

The voltage applied to the electrode in the spin chuck meets Applicant's limitation of claim 27 of generating a second electric field below the substrate having an electric polarity opposite to an electric polarity of the coating material. As to claim 28, it is known that the force applied to the coating material by the electrical field is almost equal to the gravitational force exerted on the coating material because the coating material is caused to spread on the substrate due to the electric field.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. JP 8-167551 A is cited to demonstrate the state of the art with respect to applying coating material on a substrate using an electrical field.

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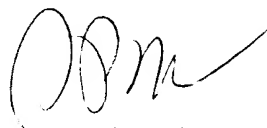
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten Crockford Jolley whose telephone number is 703-306-5461. The examiner can normally be reached on Monday to Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on 703-308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1193.

kcj

December 16, 2002

A handwritten signature in black ink, appearing to be 'OBm' followed by a long horizontal stroke.